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Drug utilisation evaluation of anti hypertensive agents in type ii diabetes patients

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ABSTRACT: Hypertension in patients with type 2 diabetes mellitus is a prevalent condition that leads to substantial morbidity and mortality. Though antihypertensive agents are life saving drugs, they may produce potential DDIs which may be mild, moderate or serious. Some DDIs can result in toxicity, an alteration in desired end point, or life threatening situations. Drug Utilization Evaluation focus on factors related to prescribing, administration and interactions involved with the medication.
: A prospective, observational study was carried out in the General Medicine and Cardiology department of a 450 bedded tertiary care teaching hospital for a period of 6 months. Medical records of patients admitted to these departments during the study period were evaluated to assess the prescribing trends and poly pharmacy induced drug interactions of antihypertensive agents and recorded in a standard data entry form. The data were analysed by simple graphical methodThe DUE was conducted and 102 prescriptions were analysed.It was found that 70.5% of the study population involved female patients and most number of patients participating in the study fell in the age group of 70-79(31.3%).The most common route of administration was found to be oral(94.6%). The most widely prescribed anti-hypertensive was Metoprolol (16.5%) followed by Telmisartan (14.7%). Distribution based on number of days antihypertensive agents prescribed showed that most of the patients came under the category of 4-6 days (51.9%). In this study majority of the patients were from Cardiology department (57.8%) with various conditions like CAD (18.6%) and MI (12.7%).
Among 102 prescriptions, the total number of DDIs with antihypertensive agents were found to be 232, of which 18 are major, 179 moderate, and 35 minor interactions. The drug frequently involved in serious DDIs were PPIs (10.1%), antiplatelet agents (8.6%), anticoagulants (6.6%) and antibiotics (4.6%). The analysis revealed that there are many drugs that caused interactions with antihypertensive agents. Drugs involved in major DDIs were antiplatelet and anticoagulants. The risk factors like age, gender, type of antihypertensive agents prescribed, number of days prescribed, indication, etc. were also evaluated.

KEYWORDS: Antihypertensive, type 2 diabetes patients, Drug Utilization Evaluation , Drug Interactions.

I. INTRODUCTION

Diabetes and hypertension are the major burden of global health. The World Health Organisa-tion projected that 300 million people will suffer from diabetes and 1.5 billion people suffer from hypertension by 2025. According to the diabetes atlas 2006 published by International Diabetes Federation, the number of people with diabetes in India currently around 40.9 mil-lion, is expected to rise to 69.9 million by 2025 unless. The incidence of hypertension in pa-tients with type 2 DM is approximately two fold higher than in age matched subjects without the disease [1].
Hypertension or high blood pressure is defined as having persistent elevated systolic pressure of 140mmhg or above and diastolic blood pressure of 90mmhg or above [2]. Untreated or sub optimally treated hypertension could lead to renal diseases [3]. The seventh report of Joint Na-tional Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pres-sure (JNC7) classifies adult BP [4].Table 1

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Classification	Systolic (mmhg)	Diastolic (mmhg)
Normal	<120	<80
Prehypertension	120 -139	80-89
Stage 1 hypertension	140 - 159	90-99
Stage 2 hypertension	≥160	≥100

Hypertension is divided into two types:

1. Primary Hypertension (Essential Hypertension)
2. Secondary Hypertension (Non –Essential Hypertension)

PRIMARY HYPERTENSION

It result when arterial pressure due to increased peripheral resistance, it is further divided into

- ❖ Benign hypertension
- ❖ Malignant hypertension

SECONDARY HYPERTENSION

The different forms of secondary hypertension are,

1. Cardiovascular hypertension – it is produced due to
- Atherosclerosis
- Coarctation of aorta – narrowing of aorta

2. Renal hypertension – it is produced due to
- Stenosis of renal arteries
- Glomerulonephritis

3. Endocrine hypertension – it is produced due to
- Phenochromocytoma
- Hyperaldosteronism
- Cushing syndrome
- Acromegaly

4. Neurogenic hypertension

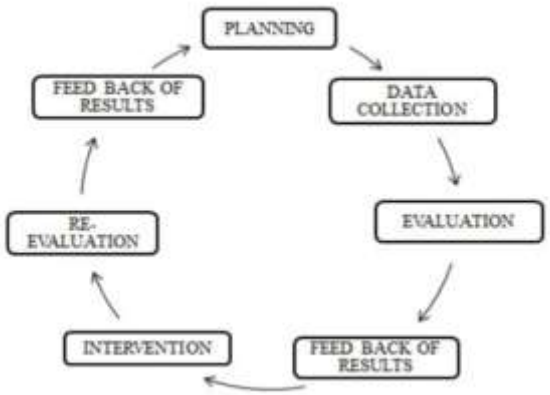
Acute hypertension can be caused by strong stimulation of sympathetic nervous system

- Section of the baroreceptors nerves
- Lesions of tractussolitarius
- Increase intracranial pressure [5].

DRUG UTILISATION EVALUATION (DUE)

Drug utilisation evaluation is an ongoing, authorised and systematic quality improvement pro-cess, which is designed to review drug use, provide feedback of result to clinicians and other relevant groups, to develop criteria and standards which describe optimal drug use, to pro-mote appropriate drug use through education and other interventions. A DUE is drug or dis-ease specific and can be administering a drug (indications, dose, drug interactions, etc.). DUE same as drug utilization review (DUR) and terms are used synonymously.

ESTABLISHMENT OF DUE PROGRAM AND DUE CYCLE



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II. AIM & OBJECTIVE

Aim

- To assess the drug utilisation pattern of antihypertensive agents in type 2 diabetes patients in a tertiary care teaching hospital..

Objective

- To assess the drug utilisation pattern of antihypertensive agents in type 2 DM patients.
- To identify most commonly prescribed anti-hypertensive agents.
- To evaluate concurrent drugs prescribed along with anti-hypertensive agents.
- To monitor drug –drug interactions in patients using Lexi comp and Medscape online internet databases to categorise interaction according to severity

III. METHODOLOGY

Study design:
A prospective observational study will be conducted by collecting data from patient case sheet of a 450 bedded tertiary hospital.
Study location:
A prospective observational study will be conducted by collecting data from patient case sheet of a 450 bedded tertiary hospital.
Study duration:
The study will be conducted for a period of six months from October 2019 to March 2020.
Study population:
Not less than 100 patients admitted in general medicine and cardiology departments will be considered in the study.
Study tools:
1) Data Entry Form.

Study criteria:
Inclusion criteria:
Both males & females of ≥18 years.
Patients admitted in general medicine & cardiology department with the history of diabetes and hypertension.
Diabetes patients prescribed with at least one anti-hypertensive agents.

Exclusion criteria:

- Hypertensive patients who were non – diabetic.
- Out patients, children, pregnant women.
- Patients who are not willing to participate in the study.
- .

Plan of study:
PHASE 1: Preparation of data entry from literature survey
PHASE 2: Collection of patient details from case sheet
PHASE 3: Assess the prescribing trends and drug interactions of anti
Hypertensive agents
PHASE 4: Analysis of data

IV. RESULTS & DISCUSSION

A prescription may be taken as reflection of physician's attitude towards the disease and the role of drug in its treatment. It also provides an insight into the nature of the healthcare delivery system. The study entitled "Drug Utilization Evaluation of Anti Hypertensive Agents In Type 2 Daibetes Patients" was a prospective prescription monitoring study carried out for a period of six months in General Medicine and Cardiology departments of a 450 bedded tertiary care hospital. The present study aimed to analyze the current prescribing pattern of anti hypertensive agents in diabetes patients of above departments of a tertiary care unit. A total number of 102 patients were included in this study and their demographic data, social history, past medication history, medications used, dosage forms, category of drugs, number of days prescribed, concurrent medications prescribed , severity and risk category of drug interactions, medication adherence were analyzed.

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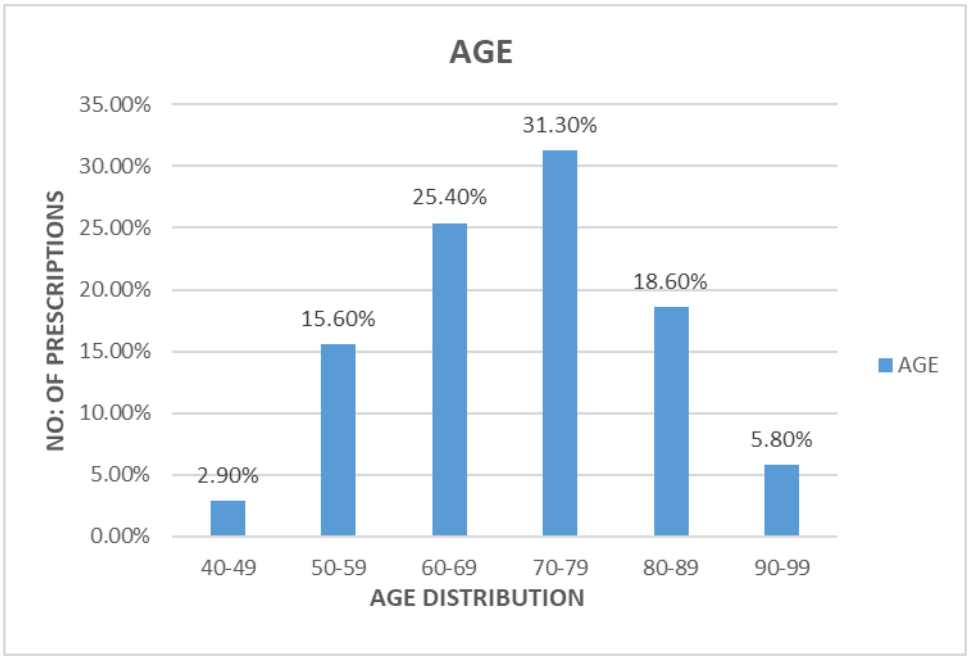

Figure 1: Distribution based on age

The study found that most number of patients participating , fell in the age group of 70-79(31.3%) and least were 40-49 years (2.9%).

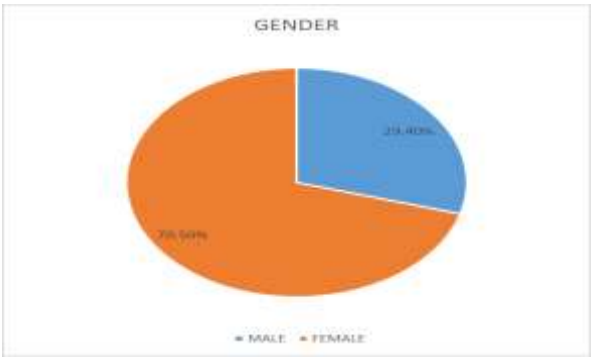

Figure 2: Distribution based on gender

The demographic analysis (figure 2) suggested that females (70.5%) were represented with more Anti Hypertensive agents in Type 2 Daibetes patients, compared to males (29.5%).

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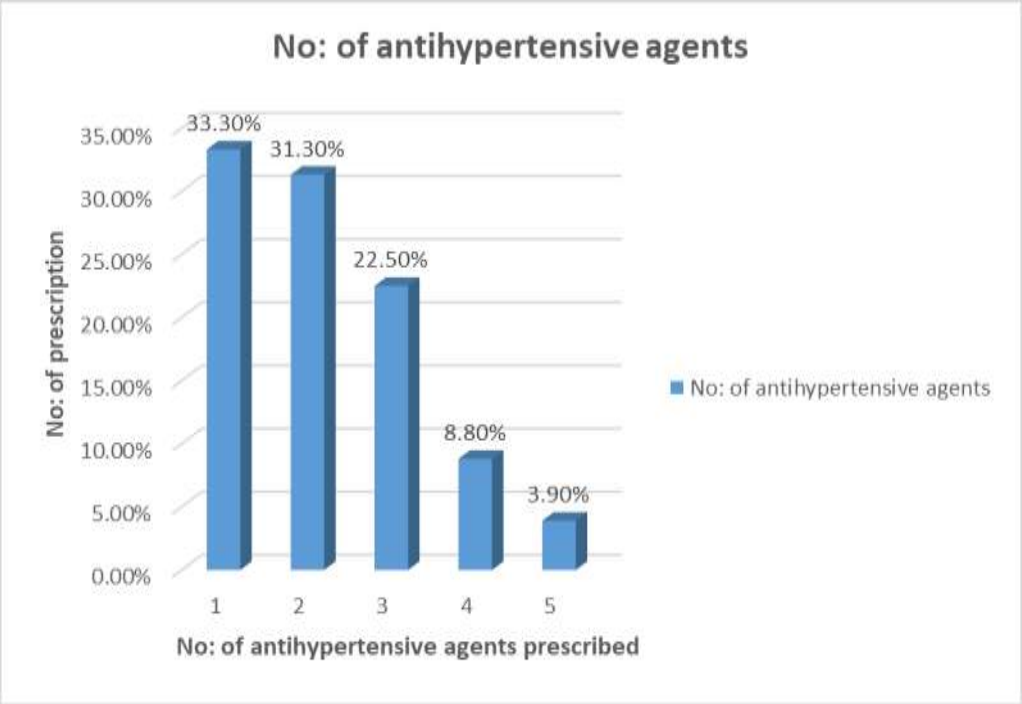

Figure 3: Distribution based on number of days antihypertensive agents prescribed showed that most of the patients came under the category of between 4-6 days (51.9%) and least was less than 4 days (19.6%)..

ROUTE OF ADMINISTRATION	NUMBER OF ANTIHYPERTENSIVE AGENTS	PERCENTAGE (%)
ORAL	**211**	**94.6**
SYSTEMIC	**12**	**5.3**

Table 1: Distribution based on route of admnistration ,oral route of administration was found to be most(94.6) and least was systemic route of administration (5.3).

TYPES OF ANTI HYPERTENSIVE AGENTS	NUMBER OF PRESCRIPTIONS	PRECENTAGE (%)
Hydrochlorothiazide	2	1
Furosemide	24	10.7
Torsemide	7	3.1
Spironolactone	10	4.4
Eplerenone	1	0.4
Ramipril	12	5.3
Lisinopril	2	0.8
Enalapril	2	0.8
Losartan	15	6.7
Olmesartan	1	0.4
Telmisartan	33	14.7
Verapamil	8	3.5
Diltiazem	1	0.4

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Nifedipine	5	2.2
Amlodipine	14	6.2
Cilnidipine	14	6.2
Atenolol	4	1.7
Metoprolol	37	16.5
Bisoprolol	4	1.7
Nebivolol	7	3.1
Carvidolol	4	1.7
Propanolol	1	0.4
Labetalol	2	0.8
Clonidine	6	2.6
Prazosin	7	3.1

Table 2: Distribution based on type of antihypertensive agentsThe most commonly prescribed antihypertensive agents were metoprolol (16.5%) and least prescribed drugs includes diltiazem, propranolol, olmesartan and eplerenone (0.4%).

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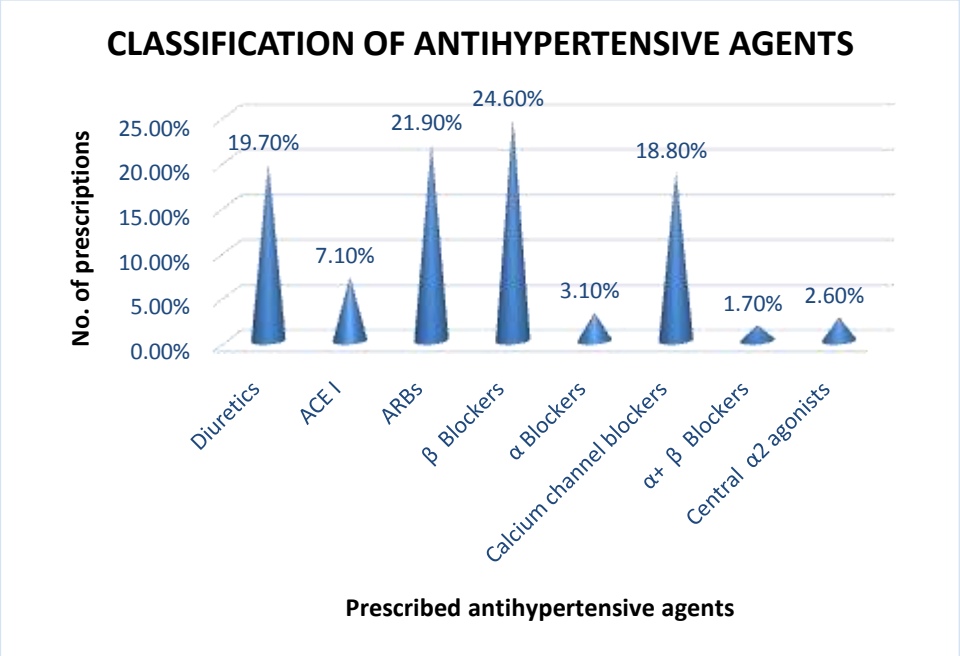

Figure 4: Distribution based on class of antihypertensive agents prescribed were β blockers (24.6%) and least prescribed was α + β blockers (1.7%).

TYPES OF ANTIHYPERTENSIVE AGENTS	NUMBER OF PRESCRIPTION	PERCENTAGE (%)
Cilnidipine +telmisartan	5	45.4
Telmisartan +metoprolol	2	18.1
Amlodipine +atenolol	1	9
Losartan +amlodipine	1	9
Telmisartan + amlodipine	1	9
Amlodipine + hydrchlorothiazide	1	9

Table 3: Distribution based on type of antihypertensive agents prescribed in combination(n=11)

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The most frequently prescribed antihypertensive agents in combination were clinidipine & telmisartan (45.4%) and least prescribed includes, amlodipine & atenolol, losartan & amlodipine, telmisartan & amlodipine, amlodipine & hydrochlorothiazide (9%).

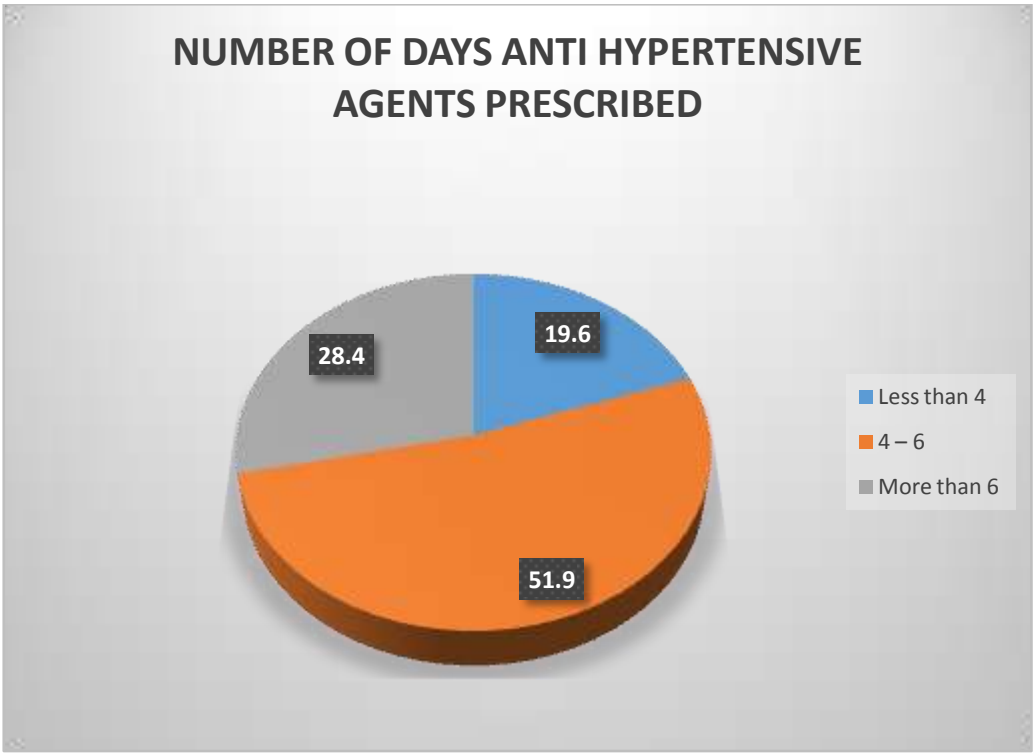

Figure 5: Distribution based on number of days antihypertensive agents prescribed.

Distribution based on number of days antihypertensive agents prescribed showed that most of the patients came under the category of between 4-6 days (51.9%) and least was less than 4 days (19.6%).

DEPARTMENTS	NUMBER OF PRESCRIPTIONS(N=102)	PERCENTAGE (%)
GENERAL MEDICINE	43	42.1
CARDIOLOGY	59	57.8

Table 5: Distrubution based on departments.

In this study majority of cases were from cardiology departments (57.8%) with various conditions like CAD (18.6%) and MI (12.7%).

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DIAGNOSIS	NUMBER OF PRESCRIPTIONS(N=102)	PERCENTAGE (%)
COPD	3	2.9
Pulmonary Edema	7	6.8
LRTI	9	8.8
UTI	6	5.8
Anemia	2	1.9
CKD	2	1.9
Cellulitis	1	0.9
Uncontrolled DM	9	8.8
CAD	19	18.6
AF	1	0.9
MI	13	12.7
ACS	9	8.8
Hyponatremia	4	3.9
Miscellaneous	17	16.6

Table 6: Distribution based on diagnosis.

In this study 102 prescriptions were analysed based on diagnosis. The diagnosis included 19(18.6%) of CAD cases followed by 13(12.7%) of MI cases, 9 (8.8%) of uncontrolled DM, LRTI and ACS cases, 7(6.8%) cases of pulmonary edema, 6 (5.8%) of UTI cases and 17 miscellaneous (16.6%) cases.

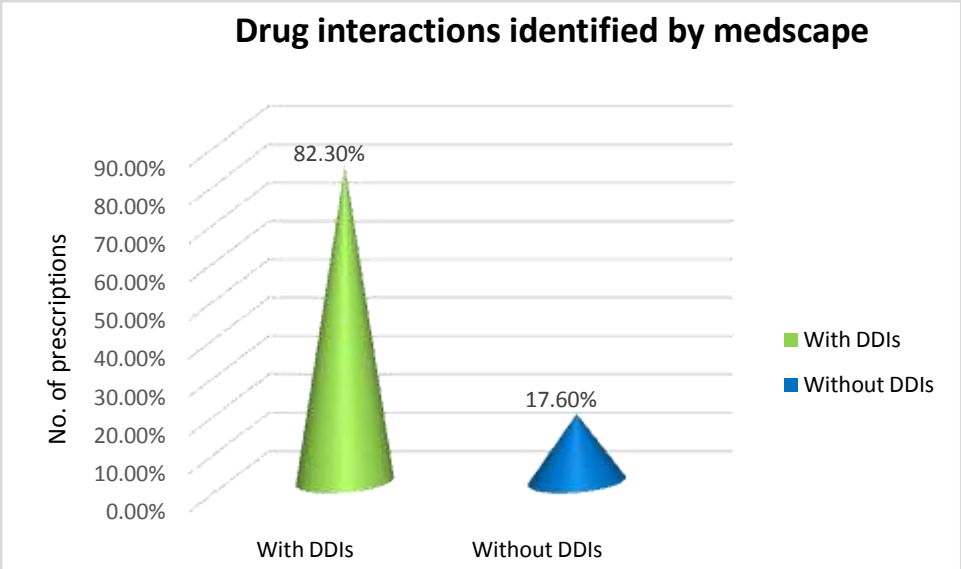

Figure 6: No.of drug interactions identified by Medscape

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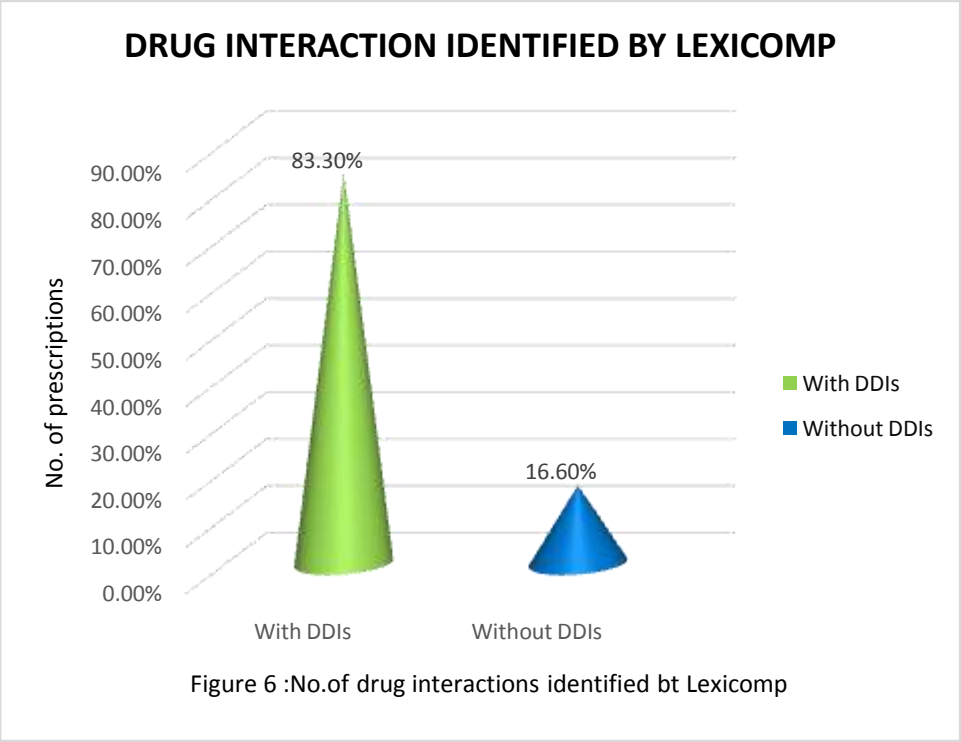

Figure 6 :No.of drug interactions identified bt Lexicomp

In this study 102 prescriptions, 84(82.3%) cases showed potential DDIs and 18(17.6%) cases showed no potential DDIs in Medscape online database.85(83.3%) cases showed poten-tial DDIs and 17(16.6%) cases showed no potential DDIs in Lexicomp online database. Among this there were a total of 26 major, 274 moderate, and 74 minor interactions. Accord-ing to the risk rating scale of Lexicomp, there were 71 interaction in category C, followed by 39 interactions in category B, 24 interactions in category D and 8 interactions in category X.

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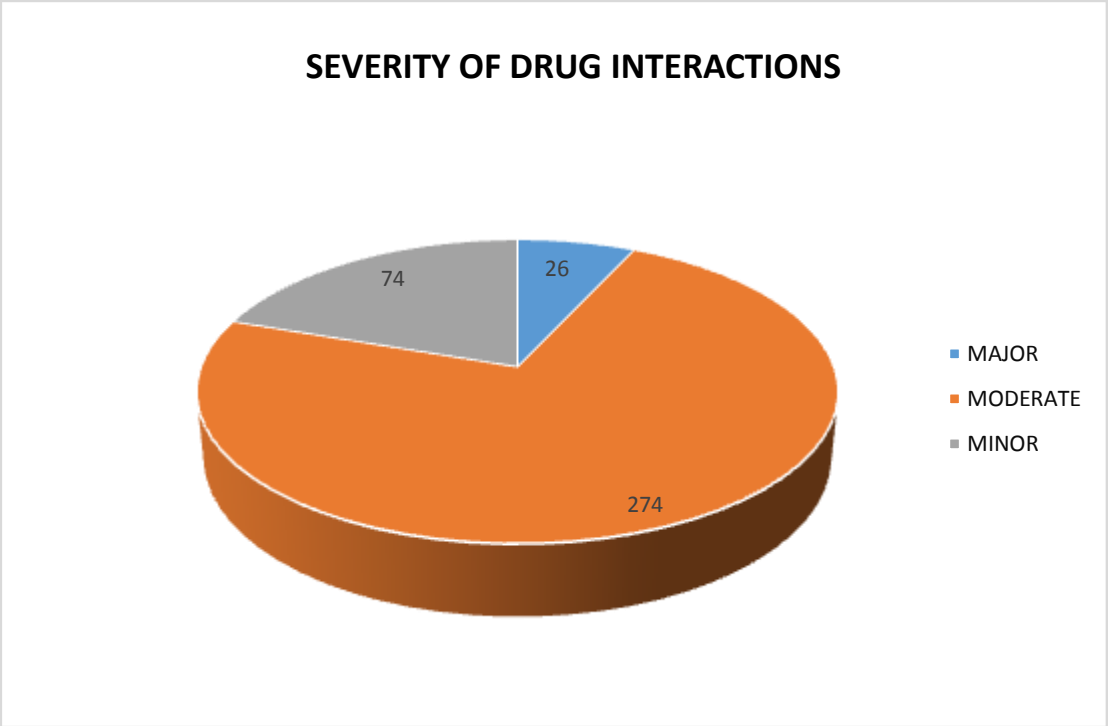

Figure 8:: Distribution based on severity of interactions .

Among 102 prescriptions, the total number of DDIs with antihypertensive agents were found to be 374, of which 26 major, 274 moderate and 74 minor interactions

RISK RATING	ACTION	NUMBER OF PRESCRIPTIONS	PERCENTAGE (%)
A	No Known Interactions	0	0
B	No Action Needed	39	27.4
C	Monitor Therapy	71	50
D	Consider Therapy Modification	24	16.9
X	Avoid Combination	8	5.6

Table 7: Distribution on risk identified by Lexicomp

SL NO.	DRUG GROUPS	NUMBER OF DDIs	SEVERITY	PERCENTAGE (%)
1	Anti-diabetic agents	45	moderate	13
2	Anti-hypertensive agents	80	moderate	23.1
3	Anti-platelet agents	30	serious	8.6
4	Corticosteroids	20	moderate	6.8
5	Anti-hyperlipidaemia agents	21	moderate	6
6	NSAIDS	13	moderate	3.7
7	Anti-Parkinsonism agents	1	moderate	0.2
8	Anticoagulants	23	serious	6.6

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9	BZDs	8	Moderate	2.3
10	PPIs	35	serious	10.1
11	Nitrates	2	moderate	0.5
12	Methyl xanthines	13	moderate	3.7
13	Antiemetics	5	serious	1.4
14	Mucolytics	2	moderate	0.5
15	Cardiac glycosides	5	moderate	1.4
16	Folic acid	4	moderate	1.1
17	Anti-psychotic agents	5	moderate	1.4
18	Analgesic	1	moderate	0.5
19	Antibiotics	16	serious	4.6
20	Tolvaptan	13	moderate	3.7
21	Antidepressant agents	2	moderate	0.5

Table 8: Distribution based on frequent drug group involved in major and moderate DDIs

The drugs frequently involved in moderate DDIs are antihypertensive agents (23.1%) and least were anti-Parkinsonism agents (0.2%) The drug involved in serious DDIs are antiplatelet (8.6%) and least were anti emetics (1.4%).

V. CONCLUSION

The current study was conducted to assess the prescribing trends and drug interactions of antihypertensive agents in a tertiary care teaching hospital with the help of online internet databases such as Lexicomp and Medscape.

The DUE was conducted and 102 prescriptions were analysed. The study concluded that antihypertensive agents were frequently prescribed in the cardiology department and most commonly prescribed antihypertensive agent was metoprolol. The class of antihypertensive agents prescribed was β blockers.

The data collection helps to understand that clinidipine and telmisartan were commonly prescribed and these drugs were prescribed for coronary artery disease. The analysis revealed that there are many drugs that caused interactions with antihypertensive agents.

The study examined major, moderate, and minor interactions among which severe DDIs were found to be more in Medscape than in Lexicomp. Drugs involved in major DDIs were antiplatelet and anticoagulants. The risk factors like age, gender, type of antihypertensives prescribed, number of days prescribed, indication, etc. were also evaluated.

The study emphasizes that the knowledge of potential DDIs can aid in developing preventive practices. It is necessary to assess the clinical significance of the interaction and find out patients at risk and also alert the patients with serious interactions.

Good care must be taken in assisting the physician in alerting the number of medications taken, preventing adverse drug reactions and DDIs to improve the health related quality of life. Thus, the potential risk to DDIs can be managed by appropriate prescriptions, monitoring, and patient education. However , there remains potential room for improvement in drug utilization and a critical need for better blood pressure control .

The medication adherence of patients can be improved by educating the patients. The study observed that,the clinical pharmacist have great role in improving medication adherence, drug safety and better patient care, to achieve better blood pressure control. The pharmacist can also promote drug safety and better patient care, among health care professionals.

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